KOOCANUSA RESERVOIR SAMPLING PROGRAM OVERVIEW 2019

Koocanusa – sampling program for the USA portion of the reservoir for 2019									
Sample medium/ constituent(s)	**Sampling frequency/ number of sites**	**Preparation of QAPPs/SAPs**	**Collection/ processing of samples**	**Sample shipping**	**Laboratory analysis**	**QA review and upload of data to WQX Portal**	**Comments**	**Method Notes / Clarifying Comments**	**Status Update Notes – October 2019**
Nutrients	Monthly; 3 sites	ACOE	ACOE	ACOE	ACOE	ACOE	Frequency rationale: established baseline monitoring		
Water chemistry (anions, cations, total metals)	Monthly; 3 sites	ACOE	ACOE	ACOE	ACOE	ACOE	Frequency rationale: established baseline monitoring		
Particulate Se	4x/yr (based on hydrograph- e.g.; May; late June-early July; Aug/Sept); 2 sites (Border, Forebay), 2 depths	ACOE	ACOE	Teck	Teck	ACOE	Should be collected at the same time as dissolved Se. Frequency rationale: recommended baseline sampling until Se waste stream stabilizes, then frequency could be reduced.	• Following Libby Dam: Kootenai River and Lake Koocanusa Water Quality Sampling and Analysis Plan 2019 • Teck providing sampling bottles/coolers, shipping and laboratory analysis	• Collected by U.S. Army Corps of Engineers, shipped for analysis • Status – May and July samples collected, sent for analysis , and sent to ACOE for QA/QC and upload • Analysis of September samples underway (at University of Georgia), expected within a month • Challenges – LIBFB – EP1 #1 (July) had small leak; University of Georgia had issues with freeze dryer so Sept. sample analysis delayed • Data to be uploaded to Water Quality Portal by U.S. Army Corps of Engineers (Teck update)
Dissolved Se	Monthly; 3 sites, 2 depths	ACOE	ACOE	ACOE	ACOE	ACOE	Same time as particulates. Frequency rationale: established baseline monitoring.	• Following Libby Dam: Kootenai River and Lake Koocanusa Water Quality Sampling and Analysis Plan 2019	
Continuous depth profiles (1-meter intervals)	Monthly; 3 sites	ACOE	ACOE	N/A	N/A	ACOE	Same time as dissolved/ particulate. Rationale: consistent with USGS and data was valuable. Rationale for US border location – continue consistency with long-term data set; enable Clean Water Act assessment decisions by MDEQ. Frequency rationale: recommended baseline sampling until Se waste treatment stabilizes, then frequency could be reduced.		
Zooplankton taxonomy and Se	May, July and September at LIBBOR, LIBTMC and LIBFB	ACOE	ACOE	ACOE	ACOE	ACOE	Frequency rationale: consistency with baseline for past 2 years. Could be altered to a frequency of 4x/year. Sampling method adjusted to match Canadian sampling method.	• Samples will be collected by vertical tow from a depth of 10 m using an 80 µm mesh net. The net will be 30 x 90 cm and equipped with a high efficiency Wisconsin reduction collar (20 cm). Collect 10g of sample.	

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Surface and benthic macroinvertebrates	2x/year May/September aligned with fish tissue timing – sampling at Tenmile (8 sites) and Border (8 sites) per 2018 QAPP locations (Appendix C)	Teck	Teck	Teck	Teck	Teck	Frequency rationale: Captures 2 seasons, spring and fall. Requesting surface tows – consistent with past sampling and shoreline sampling is not effective on US side due to steep sandy banks. Note: two different sampling methodologies will be used for two components of the Reservoir under this item, due to differing conditions on the Canadian side of the border.	• Based on QAPP - 2018INVERTQAPP.pdf • No taxonomy – sampling for Se concentration only • Benthic tissue collected by petite ponar and sample picked/composited/analyzed consistent with QAPP • Surface invertebrate tissue samples paired sites with benthic locations – sample net borrowed from DEQ - handling/analysis consistent with QAPP • Complete EDDs and tissue analysis per QAPP	• May – 8 composite BI tissue samples collected from Rexford and Tenmile areas each. Analysis complete, review for quality assurance/quality control in progress, data to be uploaded to Water Quality Portal and Koocanusa Technical Working Group prior to November meeting. Challenge - surface invertebrate sample collection attempt unsuccessful (i.e., no surface invertebrates were collected) in multiple sample events in May, June and July. • September – 8 composite BI tissue samples collected from Rexford. Composite surface invertebrate tissue sample successfully collected. Analysis in progress, data to be uploaded to Water Quality Portal and Koocanusa Technical Working Group prior to November meeting if received in time. (Teck update)
Fish	Annual MT-FWP at Rexford fish population gillnet site (1 site); in May 14/15 and September, timing based on reservoir level/spring onset	FWP/Teck	FWP / Teck	Teck	Teck	Teck	Frequency rationale: 2x/yr (spring and fall) consistent with Teck sampling and consistent with FWP/DEQ past sampling efforts. Location consistent with past efforts (US and Canada sites).	• Based on 2018 QAPP • 8 individuals (targeting mature females) per species for tissue – filet, and gonads for spring spawners in spring, filet plus gonads for fall spawners • For northern pikeminnow targeting 15 mature females 30-65 cm total length and include GSI • Collect supporting data in field consistent with 2018 QAPP	• May – 61 fish provided by Montana Fish and Wildlife Protection sampled from Rexford. Analysis complete, review for quality assurance/quality control in progress, data to be uploaded to Water Quality Portal and Koocanusa Technical Working Group prior to November meeting. • September – 41 fish provided by Montana Fish and Wildlife Protection sampled from Rexford. Analysis in progress, data to be uploaded to Water Quality Portal and Koocanusa Technical Working Group by November meeting if received in time. (Teck update)

Koocanusa – sampling program in Canadian portion of reservoir for 2019									
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Water physical structure	Thrice per year (April/June/August) - Elk River mixing in-situ transects	Sampling per the BC ENV accepted study design, submitted April 2018, and approval letter June 8, 2018	Teck	Teck	Teck	Teck	• Distributed in reservoir from north of the Elk River inlet arm down to the border • Based on temperature, turbidity, and conductivity	• Used to inform mixing and contribution of Elk River	• Transects measured from RG_KERRRD to RG_BORDER • Maps generated (Teck update)
Water chemistry	Thrice per year (April/June/August) at 5 sites; WQ sample and vertical profile (unless riverine conditions)		Teck	Teck	Teck	Teck	• Depth integrated water sample with vertical profiles following WQ monitoring plan • Turbidity transects aligned with in-situ data • Sites are proximal to mouth of Sand Creek, mouth of Elk River, mouth of Gold Creek, RG_KERRRD and RG_GRASMERE		• Collected, shipped, analyzed, reviewed for quality assurance/quality control, uploaded to EQuIS (Teck update)
Sediment quality	Once (August) near RG_KERRRD and RG_GRASMERE		Teck	Teck	Teck	Teck	• Locations based on existing WQ stations u/s and d/s of Elk River input • 5 replicates from each site for chemistry	• Sampling using petite ponar (0.023 m^2 sample area) (or steel spoon for littoral) and 3 grab samples from the top 3 cm of sediment composited to make a replicate •	• Collected, shipped, analyzed by the laboratory, and quality assurance/quality control (Teck update)
Particulate Se	Thrice per year (June, July and Sept) at 1 site; RG_DSELK);		Teck	Teck	Teck	Teck	• Dissolved concentrations to be collected concurrently		• Collected, shipped, analyzed by the laboratory • Status – June, July, and September samples collected. June samples analyzed, and quality assurance/quality control • Analysis of July and September samples underway, expected within a month (Teck update)

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Zooplankton	Twice (June & August) near RG_KERRRD and RG_GRASMERE		Teck	Teck	Teck	Teck	• Locations based on existing water quality stations u/s and d/s of Elk River input • 5 replicates from each site; tissue chemistry and taxonomy samples to be collected	• Sample collection for taxonomy based on vertical hauls of a 19cm wide 60µm mesh net – 3 hauls will be composited to make a replicate • Sample collection for metals analysis based on vertical hauls of 30 cm wide 80 µm from top 10 m and whole water column (2 samples) with 10 hauls composited to develop the sample	• Unable to collect samples near RG_KERRRD in June, despite increased sampling effort, and additional modified sampling techniques (horizontal tows at varying depths throughout the water column) as zooplankton not present in sufficient numbers for analysis. • Tissue samples from June and August analyzed, and reviewed for quality assurance/quality control, community results still pending and expected within a month.
BMI – tissue chemistry	Twice (April & August) near RG_KERRRD and RG_GRASMERE		Teck	Teck	Teck	Teck	• Captures both riverine and lake systems up and downstream of Elk River inflow • One integrated sample per site for tissue chemistry	• Samples (2 – 1 at each site) composited from 20 petite ponar grabs at each site, washed/sorted using 500µm mesh and preferentially selecting chironomids for 0.5 g WWT sample.	• Samples collected, tissue analyzed by the laboratory, reviewed for quality assurance/quality control
Fish – tissue chemistry	• Once (April) at three sites for Peamouth Chub and Redside Shiner • Thrice (April, June and August) for sportfish • Redside shiner and northern pikeminnow selenium studies* • MT FWP sampling in September near Elk River mouth		Teck / MT FWP**	Teck	Teck	Teck	• Sites are proximal to mouth of Sand Creek, mouth of Elk River and mouth of Gold Creek • Peamouth Chub, and Redside Shiner - ovaries and muscle from 10 females (lethal sampling) • Sportfish - muscle plugs from up to 8 individuals per species of captured (non-lethal sampling) • Redside shiner and northern pikeminnow studies – collection of tissue and gonad samples from fish in the reservoir during spawning period supporting laboratory work	• Fish weighed, measured, examined for external deformities – for fish lethally sampled, length, weight, and gonad and liver weights will be recorded, sex and internal deformities will be recorded	• Tissue samples analyzed by the laboratory and reviewed for quality assurance/quality control
Fish - recruitment	Once (August) at three sites for Redside Shiner only		Teck	Teck	Teck	Teck	• Sites are proximal to mouth of Sand Creek, mouth of Elk River and mouth of Gold Creek • 100 YOY from each location for EEM endpoints		• 100 young-of-the-year from each site weighed, measured, and examined for external deformities – 10 individuals from each site sacrificed for aging purposes. • Age data received and reviewed for quality assurance/quality control

*proposed and subject to fish collection / transportation approvals; ** MT FWP – Montana Fish Wildlife and Parks conducting single sample event in September, Teck processing capture fish only